

# Wastewater Treatment Facilities

**Bush Brothers & Company**

New Energy Technology  
Solutions  
for Food Processing

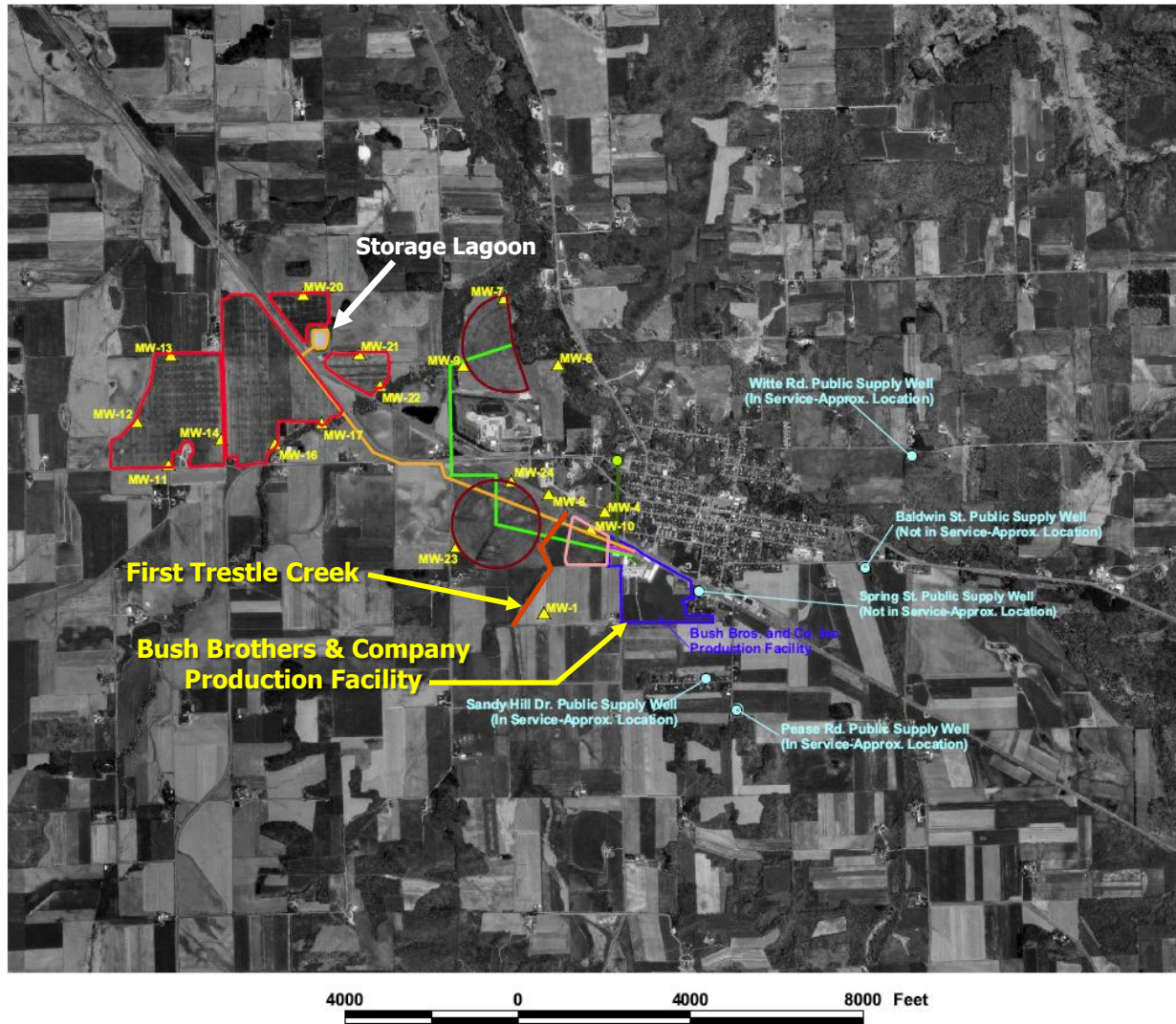
May 3, 2011







# Wastewater Discharge



## Bush Brothers and Co. Inc

### Wastewater Discharge and Treatment System Layout

- Production Facility
- ▲ Monitoring Wells
- Public Supply Wells
- Outfall 001
- Surface Discharge
- -Approx. 2000' From Production Facility

#### Land Treatment Sites

- Outfall 002
- Center Pivot Irrigation
- Billett and Curran Soils
- Outfall 003
- Seepage Cell
- Curran Soils
- Outfall 005
- Sprinkler Irrigation
- Seaton Soils

#### Wastewater Transfer Lines

- Outfall 001
- Outfall 002
- Outfall 003 and Outfall 004
- Outfall 005

# Existing Permit Requirements

## Irrigation Fields

- Application between May 1 and October 31
- No ponding
- No runoff
- Nitrogen loading less than agronomic rates

## Monitoring Wells

	Preventive Action Limit (PAL) (mg/L)	Enforcement Standard (ES) (mg/L)
Nitrite & Nitrate Nitrogen	3.6 – 14.1	10 – 14.1
Ammonia Nitrogen	2.1 – 2.3	N/A
TDS	320 - 540	

# Current Issues

- **Odors**
- **Nitrogen Loading Rates**
  - Current        273 lb/acre/yr
  - Future        546 lb/acre/yr
  - WPDES Permit        300 lb/acre/yr
- **Screenings**
  - Odors
  - Costly disposal
  - Inconvenient location



# Wastewater Flow and Loading

	Average	Max. Day
Flow	0.371 mgd	1.063 mgd
BOD5	30,882 ppd	47,412 ppd
TSS	17,592 ppd	20,576 ppd
Ammonia	63 ppd	101 ppd
TKN	1,788 ppd	2,275 ppd
TP	304 ppd	415 ppd

# Alternatives Analysis

Alternative	Present Worth	Determination
1: Cookroom Wastewater to Year-Round Absorption Pond	\$ 584,500	Accept
2: Increase Facultative Storage Lagoon Capacity with Additional Irrigation Field	\$ 4,984,000	Odors – Eliminate
3: Increase Facultative Lagoon Storage Capacity and Odor Control Roughing Filters with Additional Irrigation Field	\$ 17,180,000	Most Costly + Land Intensive – Eliminate
4: Aerated Lagoon with Additional Irrigation Field	\$ 8,550,000	Odors – Eliminate
5: Anaerobic and Aerobic Treatment Lagoon with Facultative Storage and Additional Irrigation Field	\$ 12,293,000	Odor Potential – Eliminate
6: Anaerobic and Anoxic/Aerobic Treatment Lagoon with Facultative Storage with Existing Irrigation Fields	\$ 10,943,000	Unreliable Nitrification/ Denitrification – Eliminate

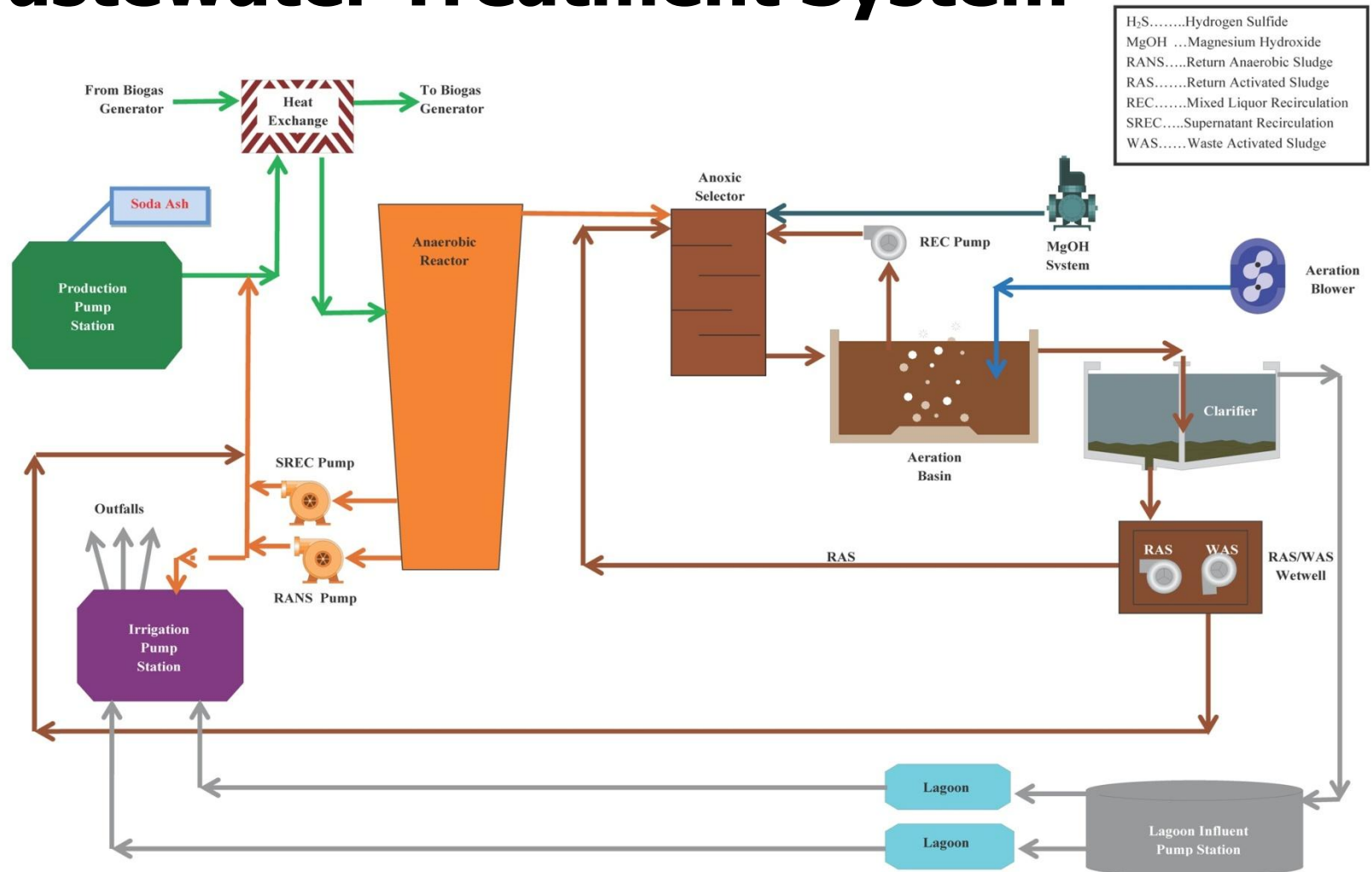
# Alternatives Analysis (Cont.)

Alternative	Present Worth	Determination
7: High-rate Anaerobic Treatment System with Aerobic/Facultative Lagoon Storage and Additional Irrigation Field	\$ 14,034,000	Complex Operation – <b>Eliminate</b>
8: High-rate Anaerobic Treatment System with Anoxic/Aerobic Lagoon and Facultative Storage with Existing Irrigation Fields	\$ 12,804,000	Unreliable Nitrification/ Denitrification - <b>Eliminate</b>
9: Low-rate Anaerobic Reactor and Activated Sludge System with Surface Water Discharge	\$ 14,204,000	Rivers are Over-Allocated – <b>Eliminate</b>
10: Low-rate Anaerobic Reactor and Activated Sludge System with Absorption Pond Discharge	\$ 14,644,000	Chloride Concern – <b>Eliminate</b>
11: Low-rate Anaerobic Reactor and Activated Sludge System with Additional Facultative Lagoon and Existing Irrigation Fields	\$ 16,153,000	<b>Accept</b>





# Wastewater Treatment System



# Gas Utilization Economic Analysis

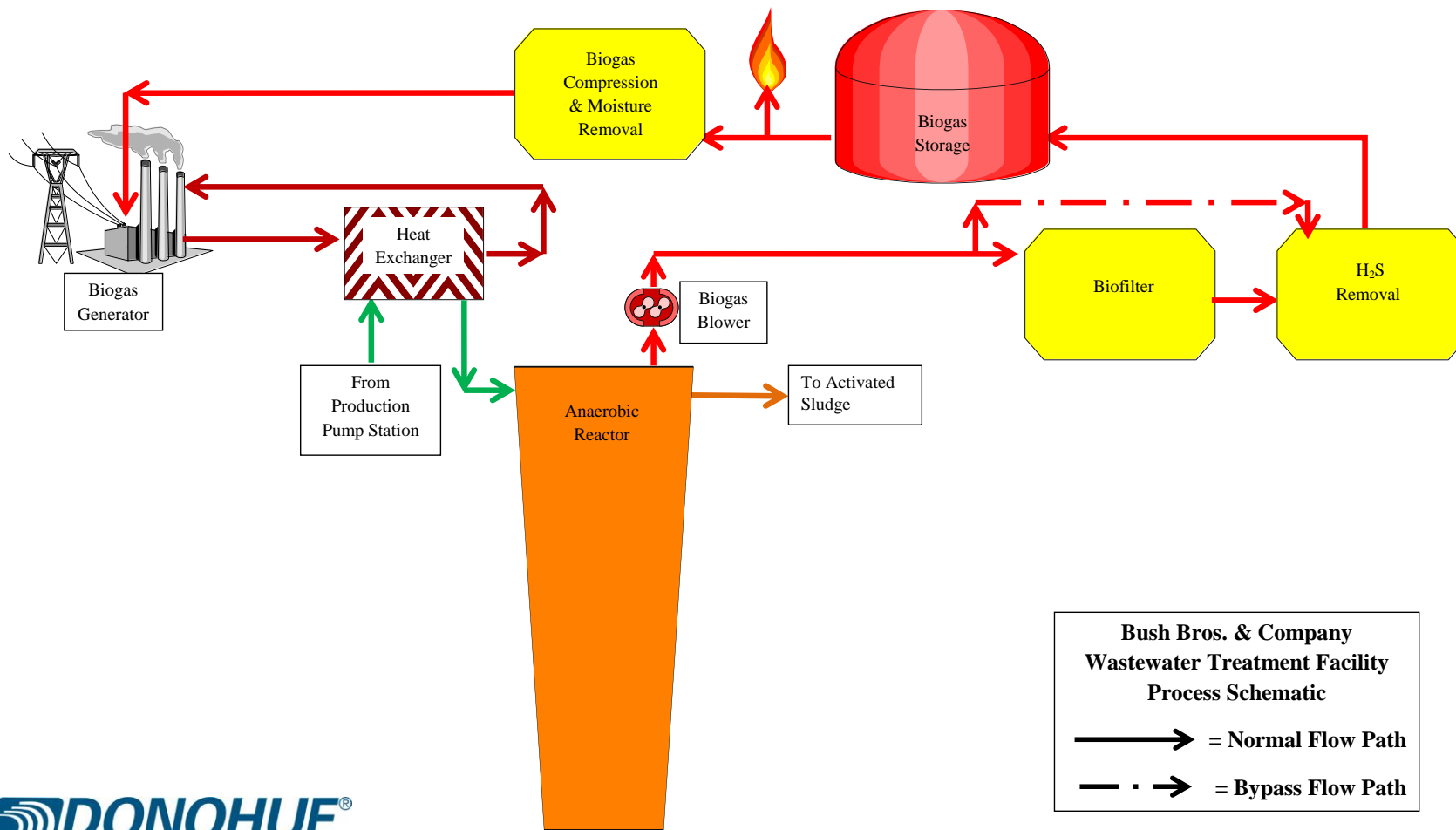
Alternative	Capital Cost	Differential Annual Operating Savings	Calculated Payback Period <sup>1</sup>
A: Microturbines	\$ 2,050,000	\$ 143,000	14 years
B: Engine Generator	\$ 2,415,000	\$ 231,000	10 years

*1. Assumes no additional funding or incentives.*





# Gas Utilization System





# As-Bid Construction Costs

Lump Sum Bid Price	\$11,381,000
Alt. 1: Biogas Generation	\$1,689,000
Alt. 2: Anaerobic Reactor HE	\$ 84,000
Alt. 3: Liner in Storage Lagoon No. 1	\$ 148,000
Alt. 4: Replace Irrigation Piping	\$127,000
Alt. 5: Biological H <sub>2</sub> S Removal System	\$757,000
<b>Total Project</b>	<b>\$14,186,000</b>

# Aeration Basins



03/21/2011



# Anaerobic Reactor



03/14/2011





03/21/2011